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CASE STUDY OF THE TOTAL QUALITY PROGRAM
IN AERONAUTICAL SYSTEMS DIVISION'S
DEPUTY FOR DEVELOPMENT PLANNING

THESIS

Scott V. Miller, Captain, USAF

AFIT/GSM/LSR/90S-20

DEPARTMENT OF THE AIR FORCE
AIR UNIVERSITY
AIR FORCE INSTITUTE OF TECHNOLOGY

Wright-Patterson Air Force Base, Ohio

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CASE STUDY OF THE TOTAL QUALITY PROGRAM
IN AERONAUTICAL SYSTEMS DIVISION'S
DEPUTY FOR DEVELOPMENT PLANNING

THESIS

Presented to the Faculty of the School of Logistics
of the Air Force Institute of Technology
Air University
In Partial Fulfillment of the
Requirements for the Degree of
Master of Science in Systems Management

Scott V. Miller, B.S.

Captain, USAF

September 1990

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Preface

The purpose of this study was to analyze the Total Quality Program in Aeronautical Systems Division's Deputy for Development Planning (ASD/XR). The results of two surveys given to ASD/XR were used in completing these analyses.

In preparing this thesis, I have had a great deal of help from others. My advisor, Major Ken Jennings, provided a great deal of guidance early in my studies, which helped smooth the way into the analysis portion of this project. During the analyses, my advisor, Dr. Kenneth Jennings, President of The Pacer Group (same person, better salary), was generous in donating his time to assist me in successfully completing this project. Mr. Steve Wourms and Captain Edward Berghorn were very helpful in providing liaison with ASD/XR on this project. Mr. Wourms conducted the first survey, and also provided guidance early in my comparative analyses which saved a great deal of time later in this effort.

Finally, I would like to thank my wife, Stephanie, who was always supportive of my thesis work, and who was kind enough not to give in to the AFIT craze of Childbearing, which would have severely reduced my concentration on this project.

Scott Miller

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Abstract

➤ This ~~study~~ ^{TRC} investigated the Total Quality Program in the Aeronautical Systems Division's Deputy for Development Planning (ASD/XR). A literature review was conducted to provide background information on key principles of Total Quality. The results of two surveys were analyzed individually and comparatively. The strata of Supervisory Status, Military/Civilian, and Directorate were compared in these analyses. The organization's attitude as a whole did not change significantly from the first to second survey. The strata of Supervisory Status showed significant differences in responses to many of the questions in both surveys, with Supervisory personnel responding more favorably. ↙

CASE STUDY OF THE TOTAL QUALITY PROGRAM
IN AERONAUTICAL SYSTEMS DIVISION'S
DEPUTY FOR DEVELOPMENT PLANNING

I. Introduction

General Issue

The Aeronautical Systems Division's Deputy for Development Planning (ASD/XR) began implementing a Total Quality program in July 1989. Since a significant amount of time and resources were being dedicated to this Total Quality program, it was prudent to determine if the desired improvements in this organization's mission performance were occurring.

Specific Problem

This research consists of a case study of the Total Quality program in ASD/XR which attempts to determine the major contributors to the successes and failures of this Total Quality program and provides recommendations for possible program improvement.

Guiding Statements

This research focuses on the influence of the Total Quality program in ASD/XR on Goals, Education, Commitment, and Culture. The following investigative questions served as the basis for this analysis. NOTE: All questions were evaluated for an overall view of XR and for the strata of Supervisory/Non-Supervisory, Military/Civilian, and by Directorate.

Investigative Questions:

Goals:

1. Do the management goals of XR support Quality service?
(XR Total Quality Culture Survey Questions 10 and 11.)
2. Do the performance goals of XR support Quality service?
(XR Total Quality Culture Survey Questions 12-15.)

Education:

3. Is the Total Quality process in XR understood?
(XR Total Quality Culture Survey Questions 1, 4, and 5.)

Commitment:

4. Does XR seek inputs about quality from its employees?
(XR Total Quality Culture Survey Questions 8 and 9.)
5. Is the mission of XR congruent with its performance requirements?
(XR Total Quality Culture Survey Questions 25-32.)

Culture:

6. Is the XR organizational structure conducive to team-building?

(XR Total Quality Culture Survey Questions 19-21.)

7. Are the employees satisfied with the XR political environment?

(XR Total Quality Culture Survey Questions 33-39.)

8. Are the employees satisfied with supervisor performance?

(XR Total Quality Culture Survey Questions 40-45.)

Scope

This research examined the Total Quality program in ASD/XR. A census survey was given to this organization in November 1989, and a second census survey was given during May 1990. The survey results were analyzed separately to determine strengths and weaknesses at the time of the surveys. A comparative analysis of the survey results was done to provide a possible source of information for determining trends in the organization with respect to quality as well as to determine areas requiring further improvement and areas of high success.

Background

The literature review presented in Chapter 2 provides background information on the key principles of Total Quality and illustrates the application of these principles through reviews of two case studies. The mission statements of ASD/XR and the ASD/XR Total Quality Team are also examined.

II. Literature Review

Scope

This literature review provides background information on the key principles of Total Quality and illustrates the application of these principles through reviews of two case studies. The mission statements of ASD/XR and the ASD/XR Total Quality Team are also examined.

Discussion of Literature

The literature reviewed for this paper consisted of current periodicals, recently published books, and mission statements from ASD/XR. Thirty-seven periodical articles written after 1980, which were listed in the Total Quality Management Pathfinder, prepared by the Wright Research and Development Center library, were initially considered as potential sources of information. Of these, fifteen were read based on their titles. Five of these articles were found to contain information pertinent to this literature review. In addition, two books on quality management were used as sources of information in this literature review. Finally, the mission statements for ASD/XR and for the ASD/XR Total Quality Team were reviewed to provide background information on the goals and expectations of this organization.

Total Quality Background

Total Quality in production and service is a concept which was pioneered in the United States (3:34). For years, reliable and affordable cars were produced in the United States and set the standard for the rest of the world (3:34). In the recent past, products made in the United States have switched from a focus on high quality and reliability to a focus on complex experiments and complicated designs (3:34). According to an article in Management Review, "Quality changed from a propellor of progress to a police action" (3:34). The general attitude in the United States' industrial base became that it was easier to buy solutions to problems rather than find flaws in the process and fix them before they became product problems (3:34). This highlights the fact that the culture of the United States underwent a change away from quality production. This is one of the key points brought out in many articles on how to restore Total Quality to American businesses and industries.

Key Total Quality Concepts. Several sources outline specific principles which are required in the successful implementation of a Total Quality program. In this section, these concepts are described and a common grouping of the principles is established.

The first source examined is The Deming Management Method by Mary Walton. In this book, Mary Walton lists the Fourteen Points which are claimed by Dr. W. Edwards Deming to be essential to the success of a Total Quality management program. These points are as follows:

1. Create constancy of purpose for improvement of product and service.
2. Adopt a new philosophy.
3. Cease dependence on mass inspection.
4. End the practice of awarding business on price tag alone.
5. Improve constantly and forever the system for production and service.
6. Institute training.
7. Institute leadership.
8. Drive out fear.
9. Break down barriers.
10. Eliminate slogans, exhortations, and targets for the workforce.
11. Eliminate numerical quotas.
12. Remove barriers for pride of workmanship.
13. Institute a vigorous program of training and retraining.
14. Take action to accomplish transformation. (9:35-36)

These Fourteen Points focus on establishing a foundation of fundamental principles from which quality management decisions can be made.

An article by Thomas R. Stuelpnagel in National Defense lists the following principles which he believes are required for Total Quality:

- Customer Satisfaction
- Individual Participation
- Continuous Improvement
- Robust Design
- Variability Reduction
- Statistical Thinking
- Management Responsibility
- Supplier Integration
- Quality Control
- Education and Worker Training
- Teamwork
- Cultural Change
- Congressional Interface (8:59-60)

These principles provide ideas for improving quality in an established system. The focus is on techniques for applying the Fourteen Points previously presented.

Eight key concepts for Total Quality are explained in an article in Industrial Engineering by Loren D. Pfau. These key concepts are listed below:

- Long-term perspective.
- Upper management commitment.
- Employ a system approach.
- Training and tools.
- Participation.
- New measurement and reporting.
- Cross-organizational communication.
- Leadership. (4:18)

These eight key concepts outline the basic structure and the vital practices which an organization should use to operate a Total Quality program. These key concepts represent a hybrid of Deming's Fourteen Points and Stuelpnagel's principles in

that aspects of the fundamental foundation of a Total Quality program are combined with aspects of the program's implementation.

These three sources have provided examples of the concepts which seem to be required for a successful Total Quality system. The concepts and principles presented in these lists fall into four general categories: Goals, Education, Commitment, and Culture. These four categories are defined below using the explanations of the principles and key concepts previously listed.

Goals are the long-term desires of the organization. They encompass the idea of where the organization is headed in the future, and how it will commit to satisfying customer needs with quality products (8:59). Goals provide an organization with an opportunity to strive to stay in business over the long run by not focusing on the quick fix to a problem, but instead by concentrating on constant improvements which will lead the company to new standards of excellence (6:254-255).

Education focuses on the training required in both job skills and in quality concepts. Education in the areas of quality and job skills should be done on a continuing basis (8:60). This education should include the key fundamentals of Total Quality, the basic job skills, the taking of risks

and removing the fear of failure, and the feedback from the work done by others (4:20).

Commitment is the individual and corporate dedication to achieving the goals of the organization. Commitment implies that the upper managers within an organization provide actual support to and participation in the programs and in the processes required to achieve the goals of the organization (4:18). A philosophy of pride in workmanship, and dedication to constant improvement are key elements of commitment in a Total Quality program (9:34-35).

Culture is the environment within an organization. The leadership, lines of communication, working conditions, and job stability should all support a Total Quality system (8:60; 9:35). Leaders should help workers achieve quality by removing barriers and helping people do a better job, not by punishing failures (9:35). Open lines of communication within the organization should be established so people can work as a team, not as competing departments (9:35). The workplace should be equipped with necessary items to continually improve product quality (9:35). The workers should be encouraged to take risks in order to improve the quality of a product or process (4:20). Workers should not be afraid to ask questions or defend a position which is contrary to the present way of doing things (9:35). This

creativity should allow for the constant improvement sought in the Total Quality system.

Case Studies. The case studies examined in this literature review are: Lockheed's Skunk Works and Boeing Commercial Airplane.

Lockheed Advanced Development Projects, nicknamed the Skunk Works, has developed many of the world's most advanced aircraft. Some famous examples of these aircraft include the P-80 (first operational jet fighter), the U-2 (highest flying single-engine aircraft), and the SR-71 (world's fastest and highest flying aircraft) (5:87). The Skunk Works was founded by Clarence Kelly Johnson in 1943, to develop the P-80 (5:88). This organization was formed using many of the principles for Total Quality that are outlined in this paper. Today, the Skunk Works is run in a fashion consistent with the four general categories of Total Quality defined in the previous section. In the category of Goals, the Skunk Works is strongly oriented toward achieving its goal of producing quality prototype systems at a fair price on a tight schedule (5:87). In order to maintain this focus on prototyping, once a project passes the prototype stage at the Skunk Works, it is usually turned over to another division of Lockheed for production (5:88). Maintaining the focus on this goal is a key factor in the success of this

Total Quality program, which has proven itself through the continued success of the Skunk Works.

Education plays a key role in the success of the Skunk Works. Members of this team are taught the philosophy of the organization by the examples provided by the leaders of the Skunk Works, and through experimentation and encouraged risk taking (5:92).

Commitment at all work levels is one of the prime items in the success of the Skunk Works. Managers are encouraged to be leaders, providing goals and objectives to the workers, without trying to give step-by-step instructions (5:92). The workers are given the authority to accomplish their projects how they see fit, and also are encouraged to accept the responsibility for their actions (5:92). Through this leadership style and worker involvement, the Skunk Works is able to gain commitment of their entire workforce.

Finally, the culture at the Skunk Works is very favorable for Total Quality. Teamwork is essential to meet the tight schedules which are part of the environment in this organization. Each team leader at the Skunk Works is given full responsibility for selecting all members of his team (5:92). The team leader feels confident in his hand-picked team, and the members feel proud because they were selected (5:92). Ethical behavior is strongly emphasized in the Skunk Works (5:92). It is against policy to underbid a

contract to get an award (5:92). A strong system of rewards and punishment is a key part of the Skunk Works' culture (5:92). This system is quick to give recognition for individual accomplishments, and also quick to educate non-performers as to how they are failing (5:92). Another key part of this environment is that people are encouraged not to be "workaholics" (5:92). The culture at the Skunk Works relies on a person's ability to prioritize the tasks to be accomplished, which results in the elimination of many unneeded tasks (5:92).

The Skunk Works is one example of an American company which has successfully implemented a Total Quality system. Because this company has been operating under the principles of Total Quality since its origin, the Skunk Works serves as a prime example of how Total Quality can lead to a company's long-term success.

Boeing Commercial Airplane (BCA) has a long history of providing quality service to its customers. This quality service is the result of a comprehensive worldwide network of customer support (7:10). BCA has relied on feedback from its customers in order to continually improve its products and its customer service (7:10-11). Until recently, the quality of the BCA manufactured airplanes and the quality of the service provided by Boeing to their customers was enough to keep BCA very competitive in the commercial aircraft

industry (7:12). Recent demands by customers for more special features, and the introduction of the Airbus Industrie as a major price competitor in the airliner industry have forced BCA to look for new ways to remain competitive in their industry (7:12).

In order to reduce costs and to stay competitive, BCA is presently implementing ideas of Total Quality into their company to provide better products throughout the production cycle, and ultimately to the buyer of each aircraft (7:12-13). These Total Quality programs emphasize people within the company working together to improve the systems of management, production and service to reduce costs (7:13). These Total Quality programs are being implemented by conducting analyses of the tasks each department is chartered to perform, the actual work they do, and what they could do to best perform their tasks (7:14-15). A key to the success of this program is the management style of participative involvement (7:15).

Participative involvement is a system where nobody votes on an approach to take; instead, all agree on the approach (7:15). This agreement is often much more difficult to arrive at than a decision made by voting; however, once achieved, it is very powerful since everyone who agreed to the approach has a stake in the results of that decision (7:15).

The Skunk Works and Boeing Commercial Airplane represent two companies which have been successful in the past through the use of Total Quality programs. Their goals for future growth are established, and they are continually seeking improvements in their management and production methods which will allow them to enjoy continued success in the future. The next section of this paper examines the preliminary work done in the ASD/XR Total Quality program.

ASD/XR Total Quality Background. Although the Total Quality program in ASD/XR is in its early stages, a lot of effort has been invested in preparing this program for implementation. Similar to the guiding goals of the Skunk Works, ASD/XR has established long-term goals which are verbalized in the following mission statement:

THE XR VISION

We are the genesis of future aerospace systems. In partnership with our customers, we provide creative and effective system acquisition option to ensure the best-equipped air forces in the world.
In our hands - the future! (1:1)

This mission statement is an important step in establishing the Total Quality program in ASD/XR. Like the broad goals which serve as the operating foundation at the Skunk Works, the XR Vision provides this organization broad guidance for successfully carrying out their mission. This "Vision" also emphasizes a partnership with the customer, in much the same way that Boeing Commercial Airplane has relied on customer

feedback to serve as a basis for their product improvement efforts.

Within ASD/XR, there is a core group which forms the XR Total Quality Team. This group has arrived at the following mission statement to help them focus their efforts:

Our mission is to assist XR in achieving continuous improvement through a system allowing greater participation, better communication, and a stronger sense of product pride and ownership. We will establish and maintain a framework for TQ education and a process for participative corrective action. Our objective is to facilitate teamwork and trust among ourselves, within XR, and with XR's customers. (2:1)

This mission statement clearly includes the principles needed for a Total Quality program which were discussed earlier in this paper.

The XR Vision and the mission statement of the ASD/XR Total Quality Team will serve as the basis for determining the success of the Total Quality program as it is implemented in this organization.

Conclusion

From the literature reviewed, it can be concluded that there are several common principles which are believed to be essential to the success of a Total Quality program. The major categories which these principles can be grouped into are Goals, Education, Commitment, and Culture. Both the Skunk Works and Boeing Commercial Airplane have Total Quality

programs in existence. These programs seem to follow the basic principles that were discussed in this literature review. The Total Quality program in the Deputy for Development Planning at Aeronautical Systems Division appears to be organized in a way that follows the principles outlined in this literature review.

After reviewing the basic principles of Total Quality programs, examining the implementation of these programs in industry, and taking an initial look at the Total Quality program in ASD/XR, a case study of the implementation of Total Quality in ASD/XR is in order to determine the benefits, if any, of the Total Quality program in this service organization.

III. Methodology

Overview

The general method used to address the research problem was a pre-post cross-sectional survey evaluation. The survey addressed the Investigative Questions concerning the influence of the Total Quality program in ASD/XR on Goals, Education, Commitment, and Culture. A literature review was used in conjunction with analysis of the survey results to develop recommendations for possible improvements to each program.

The steps required to complete this research project included: obtaining the data from the November 1989 XR Total Quality Culture Survey, administering this same survey to ASD/XR in May 1990, analyzing both sets of survey results to identify the organization's strengths and weaknesses at the time the surveys were administered, providing recommendations on possible methods for improvement, and reporting the findings of this research to ASD/XR.

Survey

The survey used in this research was the XR Total Quality Culture Survey, developed by ASD/XR. The Investigative Questions presented in Chapter 1 are answered by various sections of this survey. A copy of the XR Total Quality Culture Survey is included as Appendix A.

A census survey was administered to ASD/XR. Strata within the population were analyzed to determine if the Total Quality programs were viewed differently between strata. The strata considered were Supervisory/Non-Supervisory, Military/Civilian, and Directorate.

Data Analysis

Results were analyzed for both Survey 1 and then Survey 2 separately to determine specific areas of strength and weakness at the time of each survey. A comparative analysis between the results of Survey 1 and Survey 2 was done to provide a possible source of information on the organization's trends in the area of Total Quality. The survey questions asked were intended to reduce the subjectivity of the responses by tying them specifically to the Investigative Questions.

The data analysis consisted of the following:

1. Report of demographic of respondents.
2. T-tests to identify statistically significant differences between the mean responses to the first and second surveys.
3. T-tests to identify statistically significant differences between mean responses for the strata considered.

4. Pearson Correlation analysis of individual survey results to determine if there was a correlation between any of the responses to the Investigative Questions.

This data analysis is presented in Chapter IV, Findings and Analysis.

IV. Findings and Analysis

Demographics

Participants in this study were from the Aeronautical Systems Division's Deputy for Development Planning (ASD/XR). Ninety-eight of the 161 people from this organization responded to the survey administered in November 1989, and 114 of the 171 people in ASD/XR answered the May 1990 survey. Tables 1 and 2 summarize the demographics of the survey respondents in the areas of Directorate, Military/Civilian, and Supervisory/Non-Supervisory for the November 1989 and May 1990 surveys respectively.

Table 1. November 1989 Survey Demographics

<u>Directorate</u>	<u>Frequency</u>	<u>Percent</u>
DMA	1	1.02
XR	3	3.06
XRE	5	5.10
XRF	4	4.08
XRH	25	25.51
XRI	5	5.10
XRL	3	3.06
XRM	19	19.39
XRO	3	3.06
XRP	5	5.10
XRS	20	20.41
XRX	2	2.04
N/R	3	3.06
TOTAL	98	100.00

Table 1. (Continued)

<u>Service</u>	<u>Frequency</u>	<u>Percent</u>
CIVILIAN	46	46.94
MILITARY	20	20.41
N/R	32	32.65
TOTAL	98	100.00

<u>Position</u>	<u>Frequency</u>	<u>Percent</u>
NON-SUPERVISORY	48	48.98
SUPERVISORY	11	11.22
N/R	39	39.80
TOTAL	98	100.00

Table 2. May 1990 Survey Demographics

<u>Directorate</u>	<u>Frequency</u>	<u>Percent</u>
DMA	0	0.00
XR	4	3.51
XRE	2	1.75
XRF	6	5.26
XRH	27	23.68
XRI	10	8.77
XRL	3	2.63
XRM	21	18.42
XRO	4	3.51
XRP	4	3.51
XRS	19	16.67
XXR	9	7.89
N/R	5	4.39
TOTAL	114	100.00

Table 2. (Continued)

<u>Service</u>	<u>Frequency</u>	<u>Percent</u>
CIVILIAN	78	68.42
MILITARY	31	27.19
N/R	5	4.39
TOTAL	<u>114</u>	<u>100.00</u>

<u>Position</u>	<u>Frequency</u>	<u>Percent</u>
NON-SUPERVISORY	82	71.93
SUPERVISORY	22	19.30
N/R	10	8.77
TOTAL	<u>114</u>	<u>100.00</u>

Results and Analysis

Results from each survey were compared for the Total Organization, and based on the strata of Supervisory Status (Supervisory/Non-Supervisory), Service Affiliation (Military/Civilian) and Directorate. Within each of these strata, responses were compared for each survey to determine differences at the time the survey was given. In addition, the results of each survey were compared to each other to determine if there were any changes from the first to second survey.

Total Organization. Tables 3 and 4 summarize the twelve highest and twelve lowest (respectively) scored responses to the questions from the two surveys.

Table 3. Twelve Highest Scored Responses

<u>Survey 1</u>		<u>Survey 2</u>	
<u>Question</u>	<u>Mean Response</u>	<u>Question</u>	<u>Mean Response</u>
40	4.0430	26	3.9255
30	3.9785	28	3.9259
14	3.9663	30	3.9140
12	3.9655	41	3.9011
41	3.9121	12	3.8391
28	3.8765	13	3.7955
15	3.8316	27	3.7912
26	3.8298	14	3.7753
17	3.8281	15	3.7684
33	3.7660	40	3.7634
13	3.7500	33	3.7553
27	3.7473	6	3.7262

Table 4. Twelve Lowest Scored Responses

<u>Survey 1</u>		<u>Survey 2</u>	
<u>Question</u>	<u>Mean Response</u>	<u>Question</u>	<u>Mean Response</u>
20	2.0735	20	2.5000
8	2.2974	46	2.6769
3	2.3580	25	2.7867
19	2.6250	3	2.8025
25	2.7067	16	2.8602
36	2.7308	36	2.8846
5	2.7412	23	2.8966
24	2.7416	24	2.9326
18	2.7619	19	2.9625
9	2.8310	21	2.9681
10	2.8966	37	3.0105
11	2.9878	44	3.0000

These results indicate that the primary weakness in this organization is the planning and coordination of efforts between different Directorates within ASD/XR. In the first survey, this question (20) received a mean score of 2.0735, and a mean score of 2.500 in the second survey. Although this response remained the lowest in both surveys, the increase from 2.0735 to 2.500 was statistically significant at a 95% confidence level based on a t-test between the responses to this question. This change seems to indicate that ASD/XR has made improvements in one of its primary areas of weakness between November 1989 and May 1990, but still requires effort in this area.

Of the twelve highest responses to each survey, only the response to Question 40 in the first survey (How approachable is your supervisor?) rated a mean score above 4.0. This indicates that ASD/XR as a whole finds none of the areas examined by these survey questions to rate as outstanding.

Table 5 lists the questions which had a significantly different response from the first to the second survey, based on the response of the entire organization.

Table 5. Survey 1 to Survey 2 Comparison

<u>Question</u>	<u>Survey 1</u>	<u>Survey 2</u>	<u>T-Score</u>
3	2.3580	2.8025	-2.39
6	3.1190	3.7262	-3.29
8	2.9474	3.4000	-2.67
17	3.8281	3.5000	1.75
18	2.7619	3.2619	-2.21
19	2.6250	2.9625	-2.03
20	2.0735	2.5000	-2.71
40	4.0430	3.7634	1.70
46	3.1077	2.6769	2.56

The significant increase in the response to Question 3 of the survey (benefit from XR Total Quality process) indicates that some improvement has been made in the perception of the Total Quality process in ASD/XR. This process is, however, still viewed in a negative manner based on responses to this question since it rated below 3.0 in both surveys. Support for the Total Quality process by the directors (Question 6)

was regarded significantly higher in the second survey, with a mean response of 3.7262.

Improvement was made from a negative feeling to a slightly positive one concerning solicitation of ideas on how to improve quality (Question 8). Question 17, which addresses performance measurement, was scored higher in Survey 1 than in Survey 2. The wording of this question is such that a lower response seems to indicate a better situation. Question 18 also addresses performance measurement and was scored higher in the second survey. Consequently, this also shows signs of improvement from the first to second survey in the organization's acceptance of performance measurement.

Questions 19 and 20 dealt with relations and coordination between the Directorates in ASD/XR. Although these questions remained below 3.0 for their mean responses, indicating a somewhat pessimistic view of this situation, they did show significant improvement compared to the first survey, indicating that some favorable changes have been made in this area.

The supervisors were viewed as significantly less approachable in the second survey than in the first. This indicates a negative move, but the mean score remained close to 4.0, which is in an area more favorable than many of the other responses.

The respondents felt significantly less confident that the TQ Culture Survey would capture the essence of what they considered to be organizational culture in the May 1990 survey. This could be a result of more critical evaluation of the survey questions, or could stem from the possibility that the people in this organization are getting tired of being surveyed. This is possible since the second survey was given only six months after the first, and since similar quality surveys had been given prior to the November 1989 survey.

Table 6 presents the mean responses of the total organization to the Investigative Questions outlined in the Methodology chapter.

Table 6. Investigative Question Responses

<u>Survey 1</u>		<u>Survey 2</u>	
<u>Question</u>	<u>Mean Response</u>	<u>Question</u>	<u>Mean Response</u>
2	3.8639	2	3.7880
8	3.5228	8	3.5000
5	3.5071	5	3.4976
7	3.2777	7	3.2696
3	3.1733	4	3.2676
4	2.9366	3	3.2000
1	2.9079	1	3.1711
6	2.7119	6	2.8785

The relative ranking of the responses from the first survey to the second remained about the same. The only statistically significant change in the response scores was in Question 4 (Does XR seek inputs about quality from its employees?) which was significantly higher in the second survey. Although this response is still low, ranking just slightly above indifference (3.0 on the survey scale), this increase seems to indicate that some improvement has been made in this area.

Pearson Correlation Coefficients were computed between the responses to the Investigative Questions for both surveys individually. Appendix B contains the two complete sets of correlation coefficients. These coefficients indicated a correlation (0.76) between Questions 6 and 8, (0.72) between Questions 5 and 7, (0.70) between Questions 7 and 8, and (0.70) between Questions 1 and 6 in Survey 1. The correlation between Questions 6 and 8 could result from a feeling that the supervisor should also be a team leader. This being the case, a low rating in team-building would also result in a low rating of supervisor performance. The same belief could hold true for the political environment. Thus, the correlation between Questions 7 and 8 could have resulted because people view the supervisors as having control over the political environment in XR.

The correlation between Questions 5 and 7 may have occurred because Question 5 addressed the factors of mission and how well XR is run as an organization, and Question 7 addressed job opportunities and satisfaction. People who are not comfortable with the mission of the organization could be expected, based on this correlation, to also rate their job satisfaction and the available opportunities low as well.

The correlation found between Questions 1 and 6 may have occurred since Question 1 addressed management goals support for Total Quality, and Question 6 addressed how the individual directorates worked together. If an individual interprets the management goals not to be supportive of Total Quality, this individual, according to this correlation, could also be expected to find weaknesses in the coordination between the individual directorates.

Survey 2 indicated an even stronger correlation between Questions 1 and 6 than did the first survey (0.79). This was the only coefficient which was higher than 0.7 between the Investigative Questions in the second survey.

Supervisory Status. Tables 7 and 8 summarize the results of the two surveys when compared for the respondents in supervisory positions to those in non-supervisory positions. Note that in all tables, T-Scores which are statistically significant at a 95% confidence level are underlined.

Table 7. Survey 1 Position Comparison

<u>Question</u>	<u>Non-Supervisory</u>	<u>Supervisory</u>	<u>T-Score</u>
1	2.5837	3.6500	- <u>2.92</u>
2	3.7610	4.2188	- <u>1.66</u>
3	2.9070	3.7273	- <u>3.74</u>
4	2.7008	3.5455	- <u>2.79</u>
5	3.3468	4.0250	- <u>3.15</u>
6	2.5000	3.3125	- <u>2.54</u>
7	3.0170	3.7429	- <u>2.97</u>
8	3.1667	3.7500	- <u>1.84</u>

Table 8. Survey 2 Position Comparison

<u>Question</u>	<u>Non-Supervisory</u>	<u>Supervisory</u>	<u>T-Score</u>
1	3.1081	3.7381	- <u>2.72</u>
2	3.7697	4.0714	- <u>1.68</u>
3	2.9955	3.9048	- <u>4.67</u>
4	3.1667	3.7250	- <u>2.67</u>
5	3.5496	3.8688	- <u>2.05</u>
6	2.8968	3.3684	- <u>2.19</u>
7	3.1972	3.7000	- <u>3.00</u>
8	3.4429	3.8000	- <u>1.68</u>

These findings clearly indicate that there is a statistically significant difference in the perceptions of the supervisors and non-supervisors in this organization on all areas considered by the Investigative Questions. This significant difference in responses between these two groups seems to indicate that as a whole, supervisors and non-supervisors in ASD/XR do not share the same perceptions of

their work environment. Although the supervisors responded significantly higher than the non-supervisors to all Investigative Questions, there was only one question (2) which they rated slightly above 4.0 in the second survey (Do performance goals of XR support quality service?). Again, this indicates that overall, not even the supervisors found any areas addressed by the Investigative Questions to rate as outstanding.

Service Affiliation. Tables 9 and 10 summarize the results of the two surveys when compared for the respondents in civilian and military service.

Table 9. Survey 1 Service Comparison

<u>Question</u>	<u>Civilian</u>	<u>Military</u>	<u>T-Score</u>
1	2.5875	3.2813	-2.22
2	3.7500	3.9559	-0.95
3	3.0526	3.1569	-0.47
4	2.7297	3.2353	-1.92
5	3.3839	3.5956	-1.04
6	2.4685	3.4048	-3.70
7	3.1172	3.4370	-1.51
8	3.1930	3.6222	-1.65

Table 10. Survey 2 Service Comparison

<u>Question</u>	<u>Civilian</u>	<u>Military</u>	<u>T-Score</u>
1	3.1643	3.5000	-1.51
2	3.8472	3.8667	-0.12
3	3.1498	3.1889	-0.20
4	3.2279	3.4107	-0.92
5	3.6736	3.4957	1.21
6	2.8418	3.3631	-2.70
7	3.2100	3.5616	-2.25
8	3.4833	3.6488	-0.87

This data indicates that as a whole, the military people seem to be more positive in their responses to these surveys in the areas addressed by the Investigative Questions. Question 6, (team-building) was viewed significantly less favorably by the civilian employees in both surveys. The mean response did improve from 2.4685 to 2.8418 from the first to second survey, however, this is still a score which indicates a negative view of the team-building potential of XR in the responses of the civilian employees. The view of the military members did not change appreciably, although it lowered slightly. This again supports the earlier observations that the team-building environment in ASD/XR needs improvement.

The second survey also indicated that the civilian employees viewed the political environment (Question 7) to be significantly less favorable than did the military. This view was, however, between 3.0 and 4.0 for both groups, indicating

that there were no strong feelings in favor of or opposed to the current XR political environment.

The outlook of the civilians and military converged in the second survey and were slightly higher than in the first regarding Questions 1, 4, and 8. This indicates some improvement but the responses do not indicate strong feelings in support of these questions.

Directorate. Tables 11 through 21 summarize the mean responses to the Investigative Questions of the Front Office and the individual Directorates compared to the mean responses of the remainder of the organization.

Table 11. XR Front Office to All Other Directorates
Comparison for Investigative Questions

<u>Question</u>	<u>Front XR</u>	<u>All Others</u>	<u>T-Score</u>
Survey 1			
3	4.0000	3.1561	<u>1.70</u>
7	4.4286	3.2481	<u>2.36</u>
Survey 2			
1	4.1667	3.2634	<u>1.72</u>
5	4.3333	3.2320	<u>1.85</u>

These comparisons indicate that people in the the Front Office believe the management of XR goals support Quality service, and that the mission of XR is congruent with

performance requirements significantly more so than the rest of the organization. The ratings of these questions was above 4.0, indicating that there is moderately strong support for these beliefs. The rest of the organization seems to have no strong opinion on these factors.

Table 12. XRE to All Other Directorates
Comparison for Investigative Questions

<u>Question</u>	<u>XRE</u>	<u>All Others</u>	<u>T-Score</u>
Survey 1			
1	4.1667	2.8718	<u>2.05</u>
2	4.4000	3.1410	<u>1.71</u>
3	3.1190	3.7262	<u>2.41</u>
4	2.9474	3.4000	<u>1.68</u>
6	3.8281	3.5000	<u>2.31</u>
8	2.7619	3.2619	<u>1.74</u>
Survey 2			
6	4.0000	2.9882	<u>1.62</u>

The first survey indicated that XRE was more positive in its responses to all questions except those about mission congruency and about satisfaction with the political environment. The responses to the second survey were not significantly different from the rest of the organization, except in the evaluation of team-building. Team-building was rated 4.0, indicating a moderately positive view of this characteristic. A possible reason for this evaluation,

compared to the other Directorates, is that XRE is an engineering support Directorate, which provides technical support to the other Directorates which manage contracted and in-house study efforts. Their role of support results in the members of this Directorate being involved in many projects, and thus participating on teams within the organization.

Table 13. XRF to All Other Directorates
Comparison for Investigative Questions

<u>Question</u>	<u>XRF</u>	<u>All Others</u>	<u>T-Score</u>
Survey 1			
1	3.8750	2.8701	<u>1.81</u>
Survey 2			
1	3.9167	3.2234	<u>1.61</u>

XRF rated the support of XR management goals for Quality service significantly higher than did the remainder of the organization. Although this rating was significantly higher than the others, it still fell below the 4.0 rating, indicating no real strong positive feeling on this point.

Table 14. XRH to All Other Directorates
Comparison for Investigative Questions

<u>Question</u>	<u>XRH</u>	<u>All Others</u>	<u>T-Score</u>
Survey 1			
6	2.4015	2.9900	-2.79
7	3.0745	3.3636	-1.64
8	2.9855	3.7407	-3.74
Survey 2			
1	2.5714	3.5347	-4.62
6	2.2754	3.2760	-5.37
8	3.1154	3.6574	-2.90

XRH rated team-building and satisfaction with supervisor performance significantly lower than the rest of the organization in both surveys. The team-building rating was approaching 2.0, indicating a moderately negative feeling about this aspect of the organization. This score also dropped from the first to the second survey, indicating an unfavorable trend away from team-building in the view of XRH, versus a positive trend from the first to second survey which was indicated by the rest of the organization. Although supervisory performance also rated significantly lower, there was a slight improvement in the mean response to this question for XRH, while the rest of the organization dropped slightly, indicating that some improvement may have occurred from the first to second survey in XRH.

Table 15. XRI to All Other Directorates
Comparison for Investigative Questions

<u>Question</u>	<u>XRI</u>	<u>All Others</u>	<u>T-Score</u>
Survey 1			
5	4.2083	3.5000	<u>1.84</u>
6	3.8333	2.7657	<u>2.15</u>
Survey 2			
1	3.8750	3.2120	<u>1.77</u>
6	3.7667	2.9654	<u>2.01</u>
7	4.2381	3.2697	<u>3.30</u>
8	4.3667	3.4167	<u>3.56</u>

XRI is a fairly small Directorate, which deals in international plans and programs. This Directorate indicated a significantly more favorable evaluation of the political environment in XR and of supervisory performance in the second survey than the rest of XR. These mean responses above 4.0 indicate strong positive feelings towards these questions. This Directorate also found team-building to be moderately positive, and rated it significantly higher than the remainder of XR. These three questions indicate that the cultural aspects in XRI may be somewhat more positive than in the rest of XR as a whole.

Table 16. XRL to All Other Directorates
Comparison for Investigative Questions

<u>Question</u>	<u>XRL</u>	<u>All Others</u>	<u>T-Score</u>
Survey 1			
NONE.			
Survey 2			
1	4.3333	3.2320	<u>1.85</u>
3	4.3333	3.1389	<u>2.33</u>
4	4.6667	3.2473	<u>2.77</u>
5	5.0000	3.5762	<u>3.15</u>
6	4.3333	2.9643	<u>2.74</u>
7	4.0000	3.3090	<u>1.62</u>

XRL is a small Directorate which provides support on logistics issues for the planning done by XR. This Directorate had a very positive outlook on most items addressed by the Investigative Questions. These high responses indicate that this Directorate is strong in the categories of Goals, Education, Commitment, and Culture, which were described in the literature review as essential elements for the success of a Total Quality program.

Table 17. XRM to All Other Directorates
Comparison for Investigative Questions

<u>Question</u>	<u>XRM</u>	<u>All Others</u>	<u>T-Score</u>
Survey 1			
2	3.5833	3.9609	-2.02
4	2.4603	3.1210	-2.93
5	3.1731	3.6328	-2.30
6	2.3810	2.9138	-2.13
Survey 2			
NONE.			

The lack of any significant difference in the responses to these questions in the second survey indicated that XRM may be representative of the feelings of XR as a whole in its perception of the current culture. This was not the case in the first survey, however, when this Directorate responded significantly lower to half of the Investigative Questions. The change from significantly lower to no significant difference from the rest of the organization indicates a positive change in the attitudes of the workers in XRM.

Table 18. XRO to All Other Directorates
Comparison for Investigative Questions

<u>Question</u>	<u>XRO</u>	<u>All Others</u>	<u>T-Score</u>
Survey 1			
1	4.0000	2.8782	<u>1.76</u>
3	3.8889	3.1496	<u>1.81</u>
4	4.1667	2.9267	<u>2.38</u>
6	4.1111	2.7536	<u>2.79</u>
7	3.9524	3.2514	<u>1.67</u>
8	4.7500	3.4822	<u>2.06</u>

Survey 2

NONE.

XRO is a small Directorate which performs the management operations tasks in support of the personnel in XR. This Directorate had no significantly different responses to the second survey compared to the rest of the organization. This was a decline from the results of the first survey, in which XRO rated Questions 1, 4, 6, and 8 moderately to very strong. Part of the reason for such a large swing could be the small number of respondents to the survey (three in November and four in May.)

Table 19. XRP to All Other Directorates
Comparison for Investigative Questions

<u>Question</u>	<u>XRP</u>	<u>All Others</u>	<u>T-Score</u>
Survey 1			
NONE.			
Survey 2			
2	3.2500	3.8827	- <u>1.72</u>

Program control support is provided by XRP. This Directorate is relatively small. Although the response to Question 2 in the second survey was significantly lower than the rest of the organization, both groups responded only slightly on the positive side. The remaining responses to both sets of Investigative Questions did not significantly vary from the rest of the organization.

Table 20. XRS to All Other Directorates
Comparison for Investigative Questions

<u>Question</u>	<u>XRS</u>	<u>All Others</u>	<u>T-Score</u>
Survey 1			
1	2.4211	3.0726	- <u>2.33</u>
2	3.5500	3.9515	- <u>2.01</u>
Survey 2			
2	3.5556	3.9226	- <u>1.97</u>
7	3.0084	3.4011	- <u>2.04</u>

XRS is the Directorate of Mission Area Planning for XR. They are relatively large, and manage the majority of the contracted study efforts that XR is responsible for accomplishing. This Directorate responded low in both surveys to questions reflecting goals. The response to Question 2, concerning performance goals, did not noticeably change from the first to second survey in either XRS or the rest of XR. This response, however, was slightly positive for XRS and only moderately positive for the rest of XR. The political environment (Question 7) was viewed with slight favor by XR, and with indifference by XRS in the second survey.

Table 21. XRX to All Other Directorates
Comparison for Investigative Questions

<u>Question</u>	<u>XRX</u>	<u>All Others</u>	<u>T-Score</u>
Survey 1			
1	5.0000	3.5167	<u>1.94</u>
2	5.0000	3.8642	<u>1.60</u>
4	5.0000	2.9481	<u>2.30</u>
5	4.6250	3.5167	<u>1.68</u>
Survey 2			
6	3.8333	3.2088	<u>1.76</u>

The significant differences in the first survey responses are shown, however, they are based on only one respondent from XRX, therefore, they are not considered representative of this Directorate. There were nine respondents in the second survey, thus the difference in response to Question 6 (team-building) is considered to be representative and statistically significant.

Tables 22 through 32 summarize the responses rated high (4.0 or greater) and the responses rated low (less than 3.0) to the survey questions by Directorate, and compare these to the remainder of the organization's responses to test for statistical significance (at the 95% confidence level). Responses which were significantly higher or lower than the remainder of the organization's, but which did not meet the

criteria of less than 3.0 or 4.0 or greater are denoted by an asterix (*) following the question number. Due to the wording of Question 17, a negative response (lower score) is more favorable. Question 17 is highlighted with an asterix (*) following the T-Score. All T-Scores which indicate statistical significance at the 95% confidence level are underlined in these tables.

Table 22. XR Front Office to All Other Directorates
Comparison for Survey Questions

<u>Question</u>	<u>Front XR</u>	<u>All Others</u>	<u>T-Score</u>
Survey 1			
High			
1	4.3333	3.2184	<u>1.64</u>
2	4.0000	3.6593	0.61
3	4.5000	2.3171	<u>2.82</u>
4	5.0000	3.4186	<u>2.04</u>
6	4.0000	3.1529	0.67
8	4.3333	2.9222	<u>2.00</u>
10	4.0000	2.8941	1.28
12	4.0000	4.0000	0.00
13	5.0000	3.7241	1.16
14	4.5000	3.8876	0.86
15	4.0000	3.8478	0.35
17	4.0000	3.8472	0.21*
18	4.0000	2.9683	0.86
21	4.0000	2.9780	1.28
26	4.6667	3.8132	1.44
27	4.3333	3.7640	0.92
29	4.0000	3.6049	0.60
30	4.5000	3.9890	0.64
31	4.0000	2.9733	<u>1.74</u>
32	4.0000	3.0714	1.06
33	4.3333	3.7667	1.01
34	5.0000	3.7033	<u>1.78</u>
35	4.6667	3.1573	<u>2.22</u>
37	4.0000	3.0330	1.47
38	4.3333	3.2809	<u>1.65</u>
39	4.3333	3.2857	<u>1.90</u>
40	4.0000	4.0449	-0.06
41	4.5000	3.9080	0.72
Low			
20	2.0000	2.1282	-0.27
36	2.6667	2.7089	-0.06

Table 22. (Continued)

<u>Question</u>	<u>Front XR</u>	<u>All Others</u>	<u>T-Score</u>
Survey 2			
High			
2	4.0000	3.4660	0.97
5	4.0000	2.9691	1.98
6	4.7500	3.7200	1.83
7	4.0000	3.0686	1.50
8	4.0000	3.3077	1.22
9	4.0000	3.0957	1.60
10	4.2500	3.1863	1.82
11	4.3333	3.2424	1.75
12	4.7500	3.9300	1.75
13	4.5000	3.8119	1.75
14	4.2500	3.8300	0.84
17	5.0000	3.4043	1.43*
18	4.0000	3.2703	0.69
19	4.0000	2.9579	1.97
21	4.0000	3.0192	1.68
22	4.0000	3.6699	0.57
23	4.0000	2.9223	1.63
24	4.0000	2.9175	1.76
25*	3.7500	2.8247	1.68
26	4.5000	3.9412	1.24
27	4.2500	3.8333	0.89
28	4.5000	3.9175	1.30
29	4.5000	3.5876	1.15
30	4.3333	3.9231	0.70
33	4.5000	3.7404	1.35
34	4.2500	3.6602	1.10
38	4.0000	3.1942	1.52
40	4.5000	3.7619	1.22
41	4.2500	3.9135	0.61
42	4.2500	3.6381	1.08
Low			
36	2.6667	2.9381	-0.44

The high response to Question 5 in the second survey indicates that the Front Office of XR believes that the Directors support Total Quality significantly more than the organization as a whole. This reinforces the earlier observation that the supervisors have rated their support for Total Quality higher than the organization as a whole. The response to Question 6 indicates that the Director of the Front Office is strongly supportive of Total Quality. This is a very positive response, as it has increased from 4.0 in the first survey to 4.75 in the second survey. Although the response of the Front Office was significantly higher than the response of the rest of the organization to this question in both surveys, there was an increase in this response to that of moderate support from the remainder of the organization in the second survey. This indicates a perceived positive trend in the management support for Total Quality in the organization as a whole.

For Survey 2, the responses to Questions 9 and 11 indicate that the Front Office believes that there is strong response to the employee concerns about quality, whereas the remainder of the organization rates this with no strong opinion. The Front Office also feels that they have clear-cut goals and objectives, whereas the Directorates as a whole have no strong opinion about their goals and objectives. Response

to Question 12 indicates that the Front Office has a very high assessment of the importance of producing a quality product. Although this is significantly higher than the rest of XR, the other Directorates as a whole have rated this with a moderately high response.

The Front Office rated its relations with the Directorates and the communication within the Front Office (Questions 19 and 21) as strongly positive, which was significantly higher than the rest of the Directorates. A possible reason for this is that the relations between the Front Office and the rest of the organization is carried out mainly between supervisory people, who have indicated a significantly more positive response to all of the Investigative Questions.

The Front Office indicated a significantly higher response to the use of group meetings and to the extent which they ask affected persons for their opinions before making decisions than the other Directorates as a whole (Questions 23 and 24). Again this seems to reflect the more positive response of the supervisors to all questions, since the Front Office is primarily supervisory people.

The significantly higher response of the Front Office to Question 25 (Is XR properly run?) is interesting, not because the Front Office feels this organization is more properly run

than the rest of the organization, but because the Front Office did not rate this question strongly high. Since this question is somewhat an assessment of how the Front Office feels they are performing, this indicates that they feel there is room for improvement. Although this question was not rated negatively by the rest of the organization, overall the issue of what constitutes a properly run organization, and how XR can achieve this, needs to be addressed.

The opportunity for promotion in XR was rated low by the Front Office and by the rest of the organization in both the first and second surveys. This indicates that this is a strong problem which should be addressed in order to improve the situation.

Table 23. XRE to All Other Directorates
Comparison for Survey Questions

<u>Question</u>	<u>XRE</u>	<u>All Others</u>	<u>T-Score</u>
Survey 1			
High			
1	4.5000	3.1977	<u>2.23</u>
2	4.2000	3.6404	<u>1.28</u>
5	4.2500	2.7176	<u>2.88</u>
6	4.7500	3.0854	<u>2.71</u>
7	4.2000	2.9639	<u>2.26</u>
8	4.0000	2.9091	<u>1.98</u>
11	4.5000	2.9024	<u>2.92</u>
12	4.4000	3.9762	<u>0.89</u>
13	4.6000	3.6867	<u>1.83</u>
14	4.6000	3.8605	<u>1.64</u>
15	4.0000	3.8444	<u>0.46</u>
16	4.5000	2.8750	<u>2.77</u>
17	5.0000	3.8192	<u>1.62*</u>
18	4.6667	2.9016	<u>2.63</u>
21	4.0000	2.9432	<u>2.08</u>
22	4.6000	3.4706	<u>2.17</u>
23	4.2000	2.9383	<u>2.16</u>
26	4.2000	3.8202	<u>0.81</u>
27	4.2000	3.7586	<u>0.91</u>
28	4.4000	3.9012	<u>1.18</u>
30	4.2000	3.8202	<u>0.41</u>
31	4.0000	2.9733	<u>1.74</u>
34	4.4000	3.6932	<u>1.50</u>
40	4.6000	4.0116	<u>1.13</u>
41	4.6000	3.8810	<u>1.36</u>
42	4.2500	3.6322	<u>1.18</u>
43	4.0000	3.4353	<u>1.11</u>
Low			
3	2.7500	2.3500	<u>0.69</u>
20	2.5000	2.1039	<u>0.97</u>
36	2.6667	2.7089	<u>-0.06</u>

Table 23. (Continued)

<u>Question</u>	<u>XRE</u>	<u>All Others</u>	<u>T-Score</u>
Survey 2			
High			
1	4.5000	3.1538	1.48
2	4.5000	3.4667	1.35
5	4.0000	2.9899	1.37
6	5.0000	3.7353	1.59
7	4.0000	3.0865	1.04
10	4.5000	3.2019	1.58
11	4.0000	3.2600	0.97
12	4.5000	3.9510	0.76
13	4.5000	3.8252	0.93
14	4.5000	3.8333	0.95
15	4.0000	3.7981	0.39
16	4.0000	2.8846	1.37
19	4.0000	2.9794	1.37
20	4.0000	2.4157	<u>2.37</u>
21	4.0000	3.0377	1.17
22	4.5000	3.6667	1.03
23	4.0000	2.9429	1.13
25	4.0000	2.8384	1.51
26	4.5000	3.9519	0.88
27	4.0000	3.8462	0.23
28	4.5000	3.9293	0.91
29	4.5000	3.5876	1.15
30	4.0000	3.9333	0.09
31	4.0000	3.2717	0.94
32	4.0000	3.2632	0.81
33	4.5000	3.7547	0.94
34	4.5000	3.6667	1.11
38	4.0000	3.2095	1.06
39	4.0000	3.3551	0.84
40	4.0000	3.7850	0.25
41	4.5000	3.9151	0.76
42	4.5000	3.6449	1.07
Low			
3	2.5000	2.8039	-0.40

XRE responded significantly higher to many of the questions in the first survey, but in the second survey, they only responded significantly higher to Question 20. This question addressed the planning and coordination of efforts between Directorates. Not only did this question rate significantly higher than the rest of the organization, it also went from one of the lowest rated responses in the first survey to a strongly positive rating in the second survey. This change in opinion indicates very positive progress in this Directorate's view of planning and coordinating with other Directorates.

The response which was somewhat negative to both the first and second surveys was that of benefits from the XR Total Quality process. This low response may be because this organization rated itself fairly high at the time of the both surveys, thus they did not perceive a strong need for improvement. Consequently, this organization should not be expected to see as much benefit from such a program as would an organization which was in greater need of improvement.

Table 24. XRF to All Other Directorates
Comparison for Survey Questions

<u>Question</u>	<u>XRF</u>	<u>All Others</u>	<u>T-Score</u>
Survey 1			
High			
10	4.0000	2.8675	<u>1.85</u>
13	4.7500	3.6905	<u>1.91</u>
14	4.7500	3.8621	<u>1.78</u>
15	4.2500	3.8352	1.12
21	4.0000	2.9551	<u>1.84</u>
26	4.5000	3.8111	1.33
27	4.7500	3.7386	<u>1.90</u>
28	4.7500	3.8902	<u>1.86</u>
29	4.5000	3.5750	<u>1.65</u>
30	4.7500	3.9866	0.38
33	4.0000	3.7753	0.46
34	4.5000	3.6966	1.53
35	4.0000	3.1705	1.38
40	4.2500	4.0345	0.37
41	4.2500	3.9059	0.58
42	4.2500	3.6322	1.18
43	4.0000	3.4419	0.99
Low			
3	2.6667	2.3580	0.46
4	2.7500	3.4881	-1.31
5	2.5000	2.8000	-0.54
7	2.5000	3.0595	-0.90
12*	3.0000	4.0349	<u>-1.72</u>
17	2.3333	3.9155	<u>-2.79*</u>
18	2.0000	3.0328	-1.48
19	2.2500	2.7262	-0.90
20	2.2500	2.1169	0.32
23	2.5000	3.0366	-0.81
25	1.3333	2.8052	<u>-2.79</u>
38	2.7500	3.3409	-1.05
45	2.0000	3.0759	-1.58

Table 24. (Continued)

<u>Question</u>	<u>XRF</u>	<u>All Others</u>	<u>T-Score</u>
Survey 2			
High			
1	4.0000	3.1300	<u>1.63</u>
2	4.0000	3.4554	1.21
6	4.3333	3.7245	1.30
10	4.0000	3.1800	<u>1.70</u>
13	4.3333	3.8081	1.24
14	4.0000	3.8367	0.39
16*	3.8333	2.8500	<u>2.08</u>
21	4.1667	2.9902	<u>2.47</u>
22	4.0000	3.9600	0.71
26	4.0000	3.9600	0.11
27	4.0000	3.8400	0.42
28	4.0000	3.9368	0.17
29	4.3333	3.5591	<u>1.66</u>
30	4.6667	3.8911	<u>1.88</u>
33	4.1667	3.7451	0.91
34	4.3333	3.6436	1.57
41	4.0000	3.9216	0.17
42	4.6000	3.6019	<u>2.32</u>
Low			
3	2.5000	2.8163	-0.70
5	2.1667	3.0632	<u>-2.09</u>
7	2.8333	3.1200	-0.55
9	2.6667	3.1538	-1.19
12	2.8000	4.0202	<u>-2.73</u>
15*	3.1667	3.8400	<u>-2.26</u>
19	2.3333	3.0430	<u>-1.62</u>
20	2.1667	2.4706	-0.75
25	1.3333	2.9579	<u>-3.78</u>
31	2.1667	3.3636	<u>-2.70</u>
32	2.8333	3.3077	-0.89
36	2.6000	2.9474	-0.73
37	2.6667	3.0000	-0.77
46	2.6000	2.7558	-0.33

XRF had a very polarized response set to both surveys. The responses were generally very positive to questions which concerned the operation of their Directorate, and somewhat negative with respect to the rest of the organization and those outside of their Directorate which they work with.

A vivid example of this is the mean response of XRF to Question 25, which asks if XR is a properly run organization. XRF responded 1.3333 (outstandingly bad) to this question in the second survey, which was significantly lower than the remaining Directorates mean response to this question.

In the first survey, XRF rated the performance standards of those outside their Directorate (Question 15) very strong (4.25). In the second survey, however, XRF rated this significantly lower than did the rest of the Directorates as a whole (3.1667 versus 3.8400). This indicates a very negative trend in the perceived performance standards by XRF of the people they work with outside of their Directorate.

Table 25. XRH to All Other Directorates
Comparison for Survey Questions

<u>Question</u>	<u>XRH</u>	<u>All Others</u>	<u>T-Score</u>
Survey 1			
High			
12	4.2083	3.9294	1.16
17	4.4545	3.5962	<u>3.53*</u>
Low			
3	2.5217	2.3115	0.76
5	2.7619	2.7941	-0.12
6	2.7600	3.3279	<u>-1.95</u>
7	2.9130	3.0769	-0.55
8	2.8000	3.0294	-0.80
10	2.6818	3.0000	-1.06
11	2.6087	3.1111	<u>-1.87</u>
16	2.1600	3.2388	<u>-4.21</u>
18	2.3889	3.2174	<u>-2.62</u>
19	2.2174	2.8769	<u>-2.74</u>
20	1.9565	2.1897	-1.19
21	2.4167	3.2029	<u>-3.09</u>
22	2.9600	3.7538	<u>-3.06</u>
23	2.7600	3.1148	-1.15
24	2.3600	3.1148	<u>-2.29</u>
29*	3.1500	3.7656	<u>-2.22</u>
34*	3.0400	3.9853	<u>-4.26</u>
35	2.7600	3.3731	<u>-2.26</u>
36	2.3913	2.8305	<u>-1.60</u>
38	2.9600	3.4478	<u>-1.92</u>
40*	3.3600	4.3030	<u>-3.79</u>
41*	3.2400	4.1875	<u>-3.74</u>
42*	3.2400	3.8182	<u>-2.47</u>
44	2.5600	3.2727	<u>-2.74</u>
45	2.4783	3.2542	<u>-2.81</u>
46	2.8500	3.1852	-1.18

Table 25. (Continued)

<u>Question</u>	<u>XRH</u>	<u>All Others</u>	<u>T-Score</u>
Survey 2			
High			
1	4.0000	3.1300	<u>1.63</u>
2	4.0000	3.4554	1.21
6	4.3333	3.7245	1.30
10	4.0000	3.1800	<u>1.70</u>
13	4.3333	3.8081	1.24
14	4.0000	3.8367	0.39
21	4.1667	2.9902	<u>2.47</u>
22	4.0000	3.9600	0.71
26	4.0000	3.9600	0.11
27	4.0000	3.8400	0.42
28	4.0000	3.9368	0.17
29	4.3333	3.5591	<u>1.66</u>
30	4.6667	3.8911	<u>1.88</u>
33	4.1667	3.7451	0.91
34	4.3333	3.6436	1.57
41	4.0000	3.9216	0.17
42	4.6000	3.6019	<u>2.32</u>
Low			
3	2.5000	2.8163	-0.70
5	2.1667	3.0632	<u>-2.09</u>
7	2.8333	3.1200	-0.55
9	2.6667	3.1538	-1.19
12	2.8000	4.0202	<u>-2.73</u>
19	2.3333	3.0430	<u>-1.62</u>
20	2.1667	2.4706	-0.75
25	1.3333	2.9579	<u>-3.78</u>
31	2.1667	3.3636	<u>-2.70</u>
32	2.8333	3.3077	-0.89
36	2.6000	2.9474	-0.73
37	2.6667	3.0000	-0.77
46	2.6000	2.7558	-0.33

This Directorate responded negatively to many of the questions on the first survey. Their responses to the second

survey were much more positive overall. An exception to this trend was the response to Question 12 (importance of quality products for the customer of XR), which was rated very positive in the first survey, but was rated significantly lower, and moderately negative in the second survey. This indicates that XRH has a negative view of the importance which XR as an organization places on quality products.

Question 19, concerning relations between Directorates, was rated significantly lower by XRH in both surveys, but did show some improvement in the second survey.

Another example of this is the mean response of XRH to Question 25, which asks if XR is a properly run organization. XRH, like XRF, responded 1.3333 (outstandingly bad) to this question in the second survey, which was significantly lower than the remaining Directorates mean response to this question.

Highlights of the positive changes within this Directorate include communication within the Directorate (Question 21), which was rated very negative and significantly lower in the first survey, to very positive and significantly higher than the rest of the Directorates in the second survey.

Awareness of the Directorate's mission (Question 30) and awareness of work expectations (Question 42) were rated extremely positive, and significantly higher than the rest of

the Directorates as a whole in the second survey. These positive trends indicate that a great deal of improvement has been made within this Directorate from the first to the second survey.

Table 26. XRI to All Other Directorates
Comparison for Survey Questions

<u>Question</u>	<u>XRI</u>	<u>All Others</u>	<u>T-Score</u>
Survey 1			
High			
13	4.6000	3.6867	<u>1.83</u>
14	4.6000	3.8605	<u>1.64</u>
15	4.4000	3.8605	<u>1.74</u>
17	4.0000	3.8451	0.25*
18	4.0000	2.9344	1.53
21	4.0000	2.9432	<u>2.08</u>
22	4.6000	3.4706	<u>2.17</u>
24*	3.8000	2.7701	<u>1.86</u>
25	4.0000	2.7013	<u>2.43</u>
29	4.3333	3.5926	1.14
30	4.4000	3.9773	0.82
34	4.0000	3.7159	0.60
35	4.0000	3.1705	1.38
38	4.2000	3.1236	<u>1.88</u>
40	4.8000	4.0000	1.54
41	4.8000	3.8690	<u>1.78</u>
42	4.0000	3.6395	0.76
44	4.2000	3.0116	<u>2.30</u>
46	4.0000	3.0694	1.20
Low			
3	2.3333	2.3704	-0.06
5	2.8000	2.7857	0.03
7	2.7500	3.0476	-0.48
8	2.6000	2.9886	-0.69
20	2.0000	2.1282	-0.27
26*	3.0000	3.8876	- <u>1.94</u>
27*	3.0000	3.3276	- <u>1.72</u>
37	2.0000	3.1236	- <u>2.22</u>

Table 26. (Continued)

<u>Question</u>	<u>XRI</u>	<u>All Others</u>	<u>T-Score</u>
Survey 2			
High			
6	4.2000	3.7128	1.31
13	4.1000	3.8105	0.86
14	4.3333	3.8000	1.57
15	4.1111	3.7732	1.35
16	4.3000	2.7604	<u>4.39</u>
19	4.0000	2.9121	<u>2.92</u>
21*	3.9000	2.9694	<u>2.48</u>
22	4.3000	3.6186	<u>1.84</u>
23*	3.7000	2.8866	<u>1.89</u>
24*	3.6000	2.8901	<u>1.77</u>
25*	3.6250	2.7957	<u>2.11</u>
29	4.2857	3.5543	<u>1.69</u>
30	4.1000	3.9175	0.55
34	4.6000	3.5876	<u>3.01</u>
38	4.0000	3.1531	<u>2.37</u>
39	4.4100	3.2929	<u>2.30</u>
40	4.7000	3.6970	<u>2.60</u>
41	4.8000	3.8367	<u>2.76</u>
42	4.7000	3.5556	<u>3.22</u>
43	4.0000	3.3608	<u>1.83</u>
44	4.3000	2.9490	<u>3.61</u>
45*	3.6667	3.0440	<u>1.61</u>
Low			
1	2.8889	3.2062	-0.71
4	2.9000	3.3367	-1.10
9	2.8889	3.1477	-0.76
20	2.6000	2.4419	0.36
26*	3.4444	4.0103	- <u>1.88</u>
46	2.1429	2.7976	- <u>1.65</u>

This Directorate responded positively to many of the questions concerning performance, teamwork, and personnel. XRI responded significantly higher than the rest of the Directorates to Questions 38 through 45. These questions dealt with the issues of recognition, job satisfaction, supervisor performance, work expectations, and feedback. These extremely positive responses indicate that the people in this Directorate find the requirements well defined, and the recognition and leadership well-suited to the organization. This Directorate rated supervisor performance higher than any of the other Directorates.

The negative responses from this Directorate focused mainly on their involvement with the XR Total Quality program (Questions 1 and 4), and the planning and coordination between XR Directorates (Question 20). Although these were rated low, they were not significantly lower than the rest of the Directorates. Awareness of XR's mission was rated slightly positive, but significantly lower than the rest of the organization.

Table 27. XRL to All Other Directorates
Comparison for Survey Questions

<u>Question</u>	<u>XRL</u>	<u>All Others</u>	<u>T-Score</u>
Survey 1			
High			
7	4.0000	3.0000	1.41
9	4.0000	2.8442	1.27
11	4.0000	2.9524	1.32
12	4.0000	4.0000	0.00
13	4.5000	3.7209	0.99
14	4.6667	3.8750	1.37
15	4.0000	3.8478	0.35
17	5.0000	3.8356	1.13*
18	4.0000	2.9683	0.86
19*	3.6667	2.6706	<u>1.66</u>
22	4.5000	3.5114	1.20
23	4.0000	2.9881	1.09
24	4.0000	2.8000	1.38
26	4.0000	3.8352	0.27
27	4.0000	3.7753	0.36
28	4.3333	3.9157	0.77
29	4.3333	3.5926	1.14
30	4.6667	3.9778	1.06
31	4.0000	3.9778	1.14
32	4.0000	3.0000	0.98
33	4.0000	3.7778	0.40
34	4.0000	3.7222	0.46
38	4.0000	3.2921	1.10
41	5.0000	4.0114	<u>1.67</u>
42	4.6667	3.6250	<u>1.75</u>
44	4.0000	3.0455	1.43
45	4.0000	3.0125	1.18
Low			
1	2.6667	3.2759	-0.89
3	2.0000	2.3827	-0.57
20	2.3333	2.1154	0.46
25	2.6667	2.7532	-0.16
36	2.6667	2.7089	-0.06
37	2.3333	3.0879	-1.15

Table 27. (Continued)

<u>Question</u>	<u>XRL</u>	<u>All Others</u>	<u>T-Score</u>
Survey 2			
High			
1	5.0000	3.1262	<u>2.57</u>
2	4.6667	3.4519	<u>1.95</u>
3	4.0000	2.7745	<u>1.62</u>
6	5.0000	3.7353	1.59
7	5.0000	3.0485	<u>2.80</u>
8	5.0000	3.2857	<u>2.69</u>
9	4.3333	3.0851	<u>2.24</u>
10	4.3333	3.1942	<u>1.70</u>
11	4.3333	3.2424	<u>1.75</u>
12	4.6667	3.9406	1.24
13	4.0000	3.8333	0.28
14	4.0000	3.8416	0.27
15	4.3333	3.7864	1.30
16	4.0000	2.8738	<u>1.70</u>
17	5.0000	3.3864	<u>2.06*</u>
18	5.0000	3.2329	<u>2.43</u>
19	4.6667	2.3977	<u>2.90</u>
20	4.0000	2.3977	<u>2.97</u>
21	4.3333	3.0190	<u>1.96</u>
22	4.6667	3.6538	1.54
23	4.0000	2.9327	1.40
24	4.3333	2.9184	<u>2.02</u>
25	4.6667	2.8061	<u>3.04</u>
26	4.6667	3.9417	1.43
27	4.6667	3.8252	1.58
28	4.3333	3.9286	0.78
29	5.0000	3.5625	<u>2.25</u>
30	4.3333	3.9231	0.70
31	4.6667	3.2418	<u>2.29</u>
32	5.0000	3.2421	<u>1.97</u>
33	4.0000	3.7619	0.37
34	4.3333	3.6635	1.09
35	4.3333	3.3900	1.55
37	4.0000	2.9524	<u>1.77</u>
38	4.0000	3.2019	1.30
39	4.0000	3.3491	1.03

Table 27. (Continued)

<u>Question</u>	<u>XRL</u>	<u>All Others</u>	<u>T-Score</u>
Survey 2			
High			
40	4.3333	3.7736	0.80
41	4.6667	3.9048	1.20
42	5.0000	3.6226	<u>2.14</u>
44	4.0000	3.0476	1.37
45	4.0000	3.0722	1.43
Low			
NONE.			

This Directorate responded significantly higher than the rest of the organization to many of the questions in the second survey which addressed the issues of the Total Quality program. XRL rated its involvement with the program, the director's support, and the belief that this program will make lasting changes in XR (Questions 1, 6, and 7) 5.0, the highest on the scale. This is the only Directorate which responded this strongly to these questions.

This Directorate also responded very positively to Question 19, which indicates they feel they have strong relations with the other Directorates. They rated planning and coordination between the Directorates (Question 20) 4.0, which was significantly higher than the rest of the organization perceived this activity. This Directorate rated

the long-term outlook for XR and their work relationship with XR (Questions 31 and 32) significantly higher than the rest of the organization. Question 42 (awareness of work expectations) also received a rating of 5.0 by XRL.

In addition to the great number of significant positive responses, this Directorate did not respond significantly lower to any questions than the remainder of the Directorates. This indicates that XRL seems to have a fairly positive outlook about XR as an organization, about their Directorate, and in favor of the XR Total Quality Program.

Table 28. XRM to All Other Directorates
Comparison for Survey Questions

<u>Question</u>	<u>XRM</u>	<u>All Others</u>	<u>T-Score</u>
Survey 1			
High			
NONE.			
Low			
1	2.9444	3.3333	-1.27
3	2.0556	2.4545	-1.34
5	2.6316	2.8286	-0.70
6	2.8333	3.2500	-1.27
7	2.8889	3.0714	-0.57
8	2.5000	3.0800	-1.83
9	2.3125	3.0000	-2.82
10	2.6471	2.9857	-1.03
11	2.6667	3.0588	-1.33
14*	3.5263	4.0000	-1.88
15*	3.5789	3.9211	-1.85
16	2.6316	3.0274	-1.30
18	2.6667	3.0816	-1.19
19	2.5000	2.7571	-0.94
20	2.2000	2.1061	0.41
21	2.4737	3.1351	-2.35
22	2.8889	3.6944	-2.75
23	2.2941	3.1884	-2.63
24	2.2778	2.9595	-2.17
25	2.6111	2.7903	-0.71
26*	3.3684	3.9600	-2.31
27*	3.3889	3.8784	-1.78
30*	3.6316	4.0946	-1.63
31	2.5294	3.1475	-2.29
32	2.9412	3.1304	-0.57
33*	3.3158	3.9054	-2.47
35	2.7778	3.3108	-1.74
43*	3.0000	3.5833	-2.04
44	2.8947	3.1250	-0.78

Table 28. (Continued)

<u>Question</u>	<u>XRM</u>	<u>All Others</u>	<u>T-Score</u>
Survey 2			
High			
4*	3.7000	3.2045	<u>1.68</u>
6	4.2500	3.6429	<u>2.22</u>
40	4.0000	3.7386	0.90
41	4.0476	3.8966	0.57
Low			
3	2.8571	2.7831	0.28
16	2.8500	2.9186	-0.24
17	2.9444	3.5325	<u>-2.05*</u>
19	2.8333	3.0370	-0.74
20	2.5556	2.4247	0.52
21	2.8000	3.1136	-1.09
25	2.8000	2.8765	-0.28
30*	3.5714	4.0233	<u>-1.89</u>
43*	3.0476	3.5116	<u>-1.81</u>
46	2.8947	2.7083	0.69

This Directorate did not respond strongly positive to any question on the first survey, and responded significantly more negatively than the rest of the organization to many of these questions. This indicates that XRM had a fairly negative opinion of the items which this survey addressed in November 1989. In May 1990, this Directorate responded significantly lower to only three question, and significantly higher to two. This indicates a positive trend in the attitude of this Directorate as a whole.

The two questions which XRM responded significantly higher than the rest of XR as a whole were understanding of the purpose of the XR Total Quality committee and director support for Total Quality (Questions 4 and 6). XRM also responded strongly positive to Questions 40 and 41, which addressed supervisor performance and support.

XRM responded significantly lower than the rest of the organization to Questions 17, 30, and 43. Question 17 was discussed in the introduction to the Directorate section. Awareness of the Directorate's mission and matching of job to job description were rated significantly lower than the rest of XR, but were not ranked below 3.0.

Table 29. XRO to All Other Directorates
Comparison for Survey Questions

<u>Question</u>	<u>XRO</u>	<u>All Others</u>	<u>T-Score</u>
Survey 1			
High			
2	4.6667	3.6374	<u>1.86</u>
4	5.0000	3.4000	<u>2.55</u>
8	4.6667	2.9111	<u>2.52</u>
10	4.0000	2.8810	1.58
11	4.0000	2.9398	<u>1.63</u>
12	4.3333	3.9884	0.57
13	4.0000	3.7294	0.42
14	4.6667	3.8750	1.37
15	4.6667	3.8261	<u>2.00</u>
16	4.6667	2.8876	<u>2.63</u>
19	4.0000	2.6588	<u>2.27</u>
21	4.6667	2.9444	<u>2.70</u>
22	4.6667	3.4943	<u>1.75</u>
23	4.0000	2.9759	1.35
24	4.6667	2.7640	<u>2.75</u>
26	4.3333	3.8242	0.85
27	4.3333	3.7640	0.92
28	4.3333	3.9157	0.77
29	4.0000	3.6049	0.60
30	5.0000	3.9667	1.59
32	4.0000	3.0714	1.06
33	4.3333	3.7667	1.01
34	4.6667	3.7000	<u>1.61</u>
35	4.0000	3.1798	1.19
38	4.6667	3.2697	<u>2.21</u>
40	5.0000	4.0114	<u>1.49</u>
41	5.0000	3.8966	1.35
42	4.6667	3.6250	<u>1.75</u>
43	5.0000	3.4318	<u>2.02</u>
44	4.5000	3.0449	<u>1.80</u>
45	4.5000	3.0000	<u>1.82</u>
46	4.3333	3.0433	<u>2.06</u>

Table 29. (Continued)

<u>Question</u>	<u>XRO</u>	<u>All Others</u>	<u>T-Score</u>
Low			
5	2.3333	2.8023	-0.74
20	2.6667	2.1026	1.21
Survey 2			
High			
6	4.2500	3.7400	0.89
10	4.0000	3.2039	1.18
12	4.2500	3.9500	0.58
13	4.2500	3.8218	0.83
14	4.2500	3.8300	0.84
15	4.0000	3.7941	0.56
22	4.0000	3.6699	0.57
24	4.3333	2.9184	<u>2.02</u>
26	4.0000	3.9608	0.09
40	4.5000	3.7619	1.22
41	4.5000	3.9038	1.08
42	4.2500	3.6381	1.08
43	4.0000	3.3981	1.11
44	4.2500	3.0288	<u>2.04</u>
45	4.2500	3.0521	<u>2.14</u>
46*	3.6667	2.7159	<u>1.61</u>
Low			
1	2.2500	3.2157	-1.49
3	2.7500	2.8000	-0.09
4	2.0000	3.3462	<u>-2.24</u>
20	2.0000	2.4659	-0.83
31	2.0000	3.3152	<u>-1.72</u>
32	2.5000	3.2947	-0.88
36	2.7500	2.9375	-0.35

XRO responded significantly higher to many questions in the first survey. In the second survey, they responded significantly higher to Questions 24, 44, and 45. These

questions addressed participative decision making, feedback, and performance evaluation respectively.

The response to Question 4 (understanding of Total Quality committees) dropped from 5.0 in the first survey to 2.0 in the second survey. This indicates that there may have been a possible misunderstanding of the purposes of these committees at the time of the first survey, leading to confusion as to their purpose at the time of the second survey. XRO rated the long-term outlook for ASD/XR (Question 31) at 2.0 in the second survey. This indicates that their downward trend in responses may be due to a bleak perception of the organization as a whole, and not necessarily a negative view of their Directorate.

Table 30. XRP to All Other Directorates
Comparison for Survey Questions

<u>Question</u>	<u>XRP</u>	<u>All Others</u>	<u>T-Score</u>
Survey 1			
High			
6	4.0000	3.1111	1.56
12	4.4000	3.9762	0.89
14	4.0000	3.8953	0.23
22	4.2000	3.4941	1.34
26	4.0000	3.8315	0.36
27	4.0000	3.7701	0.47
28	4.2000	3.9136	0.68
30	4.2000	3.9886	0.41
40	4.2000	4.0349	0.31
41	4.0000	3.9167	0.16
42	4.2000	3.6279	1.22
45	4.0000	2.9872	<u>1.71</u>
Low			
1	2.6000	3.2941	-1.30
3	2.2500	2.3750	-0.22
5	2.8000	2.7857	-0.03
7	2.8000	3.0482	-0.44
10	2.8000	2.9268	-0.23
17	2.0000	3.9028	<u>-2.69*</u>
18	2.3333	3.0164	-0.97
20	2.5000	2.1039	0.97
29	2.8000	3.6709	<u>-1.73</u>
32	2.4000	3.1358	-1.31
36	2.3333	2.7215	-0.58

Table 30. (Continued)

<u>Question</u>	<u>XRP</u>	<u>All Others</u>	<u>T-Score</u>
Survey 2			
High			
5	4.0000	2.9796	<u>1.70</u>
6	4.0000	3.7500	<u>0.44</u>
26	4.0000	3.9608	<u>0.09</u>
27	4.0000	3.8431	<u>0.34</u>
28	4.0000	3.9381	<u>0.14</u>
30	4.0000	3.9320	<u>0.13</u>
Low			
1	2.5000	3.2059	-1.08
3	2.6667	2.8020	-0.22
13	2.7500	3.8812	- <u>2.24</u>
14*	3.0000	3.8800	- <u>1.77</u>
16	2.7500	2.9118	-0.28
18	2.6667	3.3056	-1.04
21	2.5000	3.0768	-0.98
23	2.7500	2.9709	-0.33
32	2.6667	3.2979	-0.85
33	2.7500	3.8077	- <u>1.90</u>
35	2.7500	3.4444	-1.31
38	2.7500	3.2427	-0.92
39	2.7500	3.3905	-1.17
40	2.5000	3.8381	- <u>2.24</u>
42	2.5000	3.7048	- <u>2.16</u>
43	2.5000	3.4563	- <u>1.78</u>
44	2.2500	3.1058	-1.42

XRP responded significantly higher to Question 45 (accurate measurement of job performance) in the first survey. This Directorate had strong responses to the questions concerning ASD/XR's mission (Questions 26, 27, and 28) on both

surveys. Many of the responses to the second survey were lower than the responses to the first survey.

The responses which were significantly lower than the rest of XR included standards of performance (Questions 13 and 14), contribution to XR's success (Question 33), and personnel (Questions 40, 42, and 43). Questions 13, 14, and 33 were rated only slightly negatively (between 2.75 and 3.0). Question 40, 42, and 43 were rated at 2.5, which is a moderately negative response. The low responses to these questions indicate that the people in this Directorate are not completely sure what is expected of them, do not feel they are fully following their job descriptions, and are not really comfortable approaching their supervisor.

Table 31. XRS to All Other Directorates
Comparison for Survey Questions

<u>Question</u>	<u>XRS</u>	<u>All Others</u>	<u>T-Score</u>
Survey 1			
High			
26	4.1000	3.7703	1.29
27	4.0526	3.7123	1.25
33	4.0000	3.7333	1.07
40	4.2632	3.9861	0.95
41	4.2773	3.8310	1.48
Low			
3	2.0556	2.4545	-1.34
5	2.7368	2.8000	-0.22
7	2.8889	3.0714	-0.57
8	2.7368	3.0270	-0.92
9	2.5000	2.9516	-1.80
10	2.4500	3.0597	-2.01
11	2.5263	3.1045	-2.03
13	2.9444	3.9429	-3.68
16	2.9474	2.9452	0.01
19	2.4211	2.7826	-1.36
20	1.9412	2.1719	-1.06
24	2.6316	2.8767	-0.78
25	2.3333	2.8710	-2.20
31	2.6000	3.1111	-1.78
32	2.6842	3.2090	-1.67
36	2.7895	2.6825	-0.36
37	2.6000	3.1892	-2.12
46	2.4667	3.2542	-2.60

Table 31. (Continued)

<u>Question</u>	<u>XRS</u>	<u>All Others</u>	<u>T-Score</u>
Survey 2			
High			
15	4.0556	3.7500	<u>1.65</u>
23*	3.4211	2.8636	<u>1.70</u>
Low			
1	2.9474	3.2299	-0.87
2*	3.0526	3.5795	- <u>1.96</u>
3	2.8235	2.7931	0.11
5	2.8333	3.0482	-0.80
7	2.6842	3.1954	- <u>1.66</u>
9	2.8000	3.1829	-1.41
10	2.9474	3.2874	-1.16
11	2.9412	3.3412	-1.41
12*	3.5000	4.0581	- <u>2.18</u>
13*	3.1667	3.9770	- <u>3.23</u>
14*	3.5000	3.9186	- <u>1.66</u>
16	2.8333	2.9205	-0.29
20	2.6000	2.4211	0.66
21	2.9474	3.0787	-0.45
25	2.3125	2.9647	- <u>2.25</u>
26*	3.5789	4.0460	- <u>2.15</u>
27*	3.2105	3.9885	- <u>3.54</u>
28*	3.3889	4.0602	- <u>3.05</u>
30*	3.4211	4.0455	- <u>2.55</u>
31	2.9375	3.3590	-1.42
32	2.6111	3.4304	- <u>2.55</u>
36	2.6667	2.9878	-1.19
37	2.3684	3.1124	- <u>2.98</u>
38	2.7895	3.3182	- <u>2.02</u>
39*	3.0000	3.4444	- <u>1.65</u>
45	2.9412	3.1325	-0.64
46	2.5556	2.7945	-0.89

XRS had a fairly high number of negative responses to both surveys. The weaknesses identified in the first survey,

in general, were also identified as weak areas in the second survey. Many of the responses categorized as low for the second survey which were not noted in the responses to the first survey were included not because they fell below the 3.0 level, but because they were significantly less than the rest of the organization.

The significantly more positive responses to the second survey in XRS were the performance standards of those who this organization works with on a daily basis (Question 15), and the use of group meetings for problem solving (Question 23).

XRS responded significantly lower than the rest of XR, but above 3.0, to the understanding of Total Quality (Question 2), to the importance of producing a quality product (Question 12), and to director and supervisor standards of performance (Questions 13 and 14). XRS performs a great deal of project management for the contracted efforts done by ASD/XR. The low response to the director and supervisor standards, and the high rating of the standards of performance of those they work with daily, indicates that the workers in this Directorate feel they maintain standards within their project groups which are higher than is expected by their supervisor or director.

XRS also responded significantly lower to all the questions concerning mission awareness and mission understanding (Questions 26, 27, 28, and 30). Although these

responses were slightly positive, this indicates a weakness relative to the rest of the organization in the understanding of what is expected of the people in this Directorate.

This Directorate rated adequacy of resources, and recognition (Questions 37 and 38) significantly lower than the rest of XR. Although job satisfaction was rated with no strong feeling (3.0), this was significantly lower than the rating given this issue by the rest of XR.

The lack of strong improvement by this Directorate in any area, and the significantly lower responses to many of the questions, indicates that XRS was not benefitting from the Total Quality program at the time of the May survey.

Table 32. XRX to All Other Directorates
Comparison for Survey Questions

<u>Question</u>	<u>XRX</u>	<u>All Others</u>	<u>T-Score</u>
Survey 1			
High			
2	4.5000	3.6522	1.25
4	4.0000	3.4419	0.71
6	4.0000	3.1429	0.96
7	4.5000	3.0000	<u>1.74</u>
9	5.0000	2.8312	<u>2.45</u>
10	5.0000	2.8953	<u>1.75</u>
11	4.0000	2.9524	1.32
12	5.0000	3.9886	0.97
13	4.5000	3.7209	0.99
14	4.5000	3.8876	0.86
15	4.0000	3.8495	0.29
16	4.0000	2.9222	1.27
17	5.0000	3.8356	1.13*
18	4.5000	2.9355	<u>1.87</u>
19	4.0000	2.6744	<u>1.82</u>
22	4.0000	3.5227	0.58
23	5.0000	2.9882	1.55
24	4.5000	2.7889	<u>2.00</u>
25	5.0000	2.7215	<u>2.50</u>
26	4.5000	3.8261	0.92
27	4.5000	3.7667	0.97
28	4.5000	3.9167	0.89
29	4.0000	3.6145	0.34
30	5.0000	3.9891	0.90
32	5.0000	3.0706	1.58
33	4.0000	3.7802	0.32
34	4.5000	3.7143	1.06
35	5.0000	3.1868	1.54
39	5.0000	3.3011	<u>1.79</u>
40	5.0000	4.0225	1.21
41	4.5000	3.9080	0.72
42	4.5000	3.6404	1.18
46	4.0000	3.0822	0.84

Table 32. (Continued)

<u>Question</u>	<u>XRX</u>	<u>All Others</u>	<u>T-Score</u>
Survey 1			
Low			
3	2.5000	2.3659	0.17
20	2.0000	2.1250	-0.15
44	2.0000	3.0889	-0.94
Survey 2			
High			
10	4.0000	3.1546	<u>2.13</u>
12	4.4444	3.9158	1.52
15	4.0000	3.7835	0.86
19*	3.6667	2.9333	<u>2.03</u>
26	4.1111	3.9485	0.53
27	4.1111	3.8247	0.90
28	4.1111	3.9239	0.61
30	4.1111	3.9184	0.56
33	4.0000	3.7475	0.65
46*	3.3750	2.6867	<u>1.85</u>
Low			
5	2.7778	3.0326	-0.70
20	2.3333	2.4624	-0.39
24	2.5000	3.0000	-1.12
36	2.8889	2.9341	-0.12
37	2.3333	3.0404	<u>-2.01</u>
43	2.8750	3.4646	-1.52

The significant differences in the first survey responses are shown, however, they are based on only one respondent from XRX, therefore, they are not considered representative of this Directorate. There were nine respondents in the second

survey, thus these differences are considered to be representative.

The response to Question 10 indicates that this organization is strong and significantly higher than the rest of XR in understanding its Directorate goals. While Question 19 was rated significantly higher than the rest of the organization, this response is only moderately positive, indicating that relations among the Directorates in XR as a whole are not strong.

This Directorate rated the availability of the proper resources to do the job (Question 37) moderately weak, and significantly lower than the rest of XR.

Summary

This chapter has discussed the findings of the analyses which were done in evaluating the two surveys given to ASD/XR based on the organization as a whole, as well as based on the strata of Supervisory/Non-Supervisory, Military/Civilian, and Directorate. The next chapter provides the conclusions reached from these analyses, and provides possible recommendations based on these findings.

V. Conclusions and Recommendations

Conclusions

The results of the two surveys indicated that as a whole, ASD/XR has not made a great deal of progress improving the areas addressed by the Investigative Questions or the individual questions in the survey. Even the highest mean response to the second survey was below 4.0, indicating that strong positive opinions about the items addressed in this survey have not yet been reached for the organization as a whole. The areas identified as weak in the first survey did show some signs of improvement, but again did not achieve a highly positive rating in any of the questions.

The weakest area noted in both surveys was that of planning and coordination between directorates. This consistently low response indicates that this should be an area of major emphasis in improving the work culture of this organization.

The strata of Supervisory Status illustrated the most significant difference of opinion of any of the strata examined. The supervisors responded significantly higher to all of the Investigative Questions than the non-supervisors did in both surveys. This significant difference indicates that the weaknesses perceived by the non-supervisors are not

noticed by the supervisors, or are not considered as important by the supervisors as by the non-supervisors.

The strata of Service Affiliation showed two significant differences in response to the Investigative Questions. Team-building and opinion of the political environment in XR were rated significantly more positively by the military people than by the civilian employees.

Comparing the Directorates within ASD/XR to the remainder of the organization revealed many strengths and weaknesses within each Directorate. These individual areas of strength and weakness provide an excellent starting point for determining a course of action to improve the organization as a whole.

Recommendations

Although ASD/XR as a whole rated many areas weak, several Directorates in this organization showed very positive responses to most categories. These strengths within XR provide an excellent area to begin the evaluation of how to improve the present areas of weakness.

The supervisory people need to be made aware of the great difference in their view of the organizational status compared to that of the non-supervisory people. This could be done through the use of discussion sessions at the directorate level, or with representative groups from both the supervisors

and non-supervisors at an organizational level. These sessions should be designed in a non-attribution setting, in order to allow open discussion of feelings between the participants.

The literature review discussed the need for open lines of communication within an organization so people can work as a team, not as competing departments (9:35). These lines of communication need to be established within XR both between the supervisors and non-supervisors, and between the Directorates. As was noted earlier, planning and coordination between the Directorates was found to be the weakest point in the responses to both surveys. XRE, XRI, XRL, and XRX responded significantly higher to Investigative Question 6 (team-building) than did the rest of the organization. Of these Directorates, XRE and XRL are support organizations, while XRI and XRX are more program oriented. The Total Quality Team could conduct interviews with members of these Directorates to look for common factors which may be applied to improve XR's culture in the area of team-building. Since the responses to Investigative Question 6 showed correlation to Investigative Question 1, another area to consider in improving the coordination and planning of the directorates is improving the management goals of XR in support of Total Quality. XRH responded significantly lower to the team-

building question, indicating that the Total Quality Team should also interview these people to help determine what are some of the major factors which need correction to improve teamwork within this Directorate and within the rest of XR.

The findings of these interviews should be presented to ASD/XR as a whole with a plan for implementation of corrective actions. In keeping with Dr. Deming's Fourteenth Point, "Take action to accomplish transformation," once this plan is found acceptable, it should be carried out (9:36). For successful implementation of these changes, support of upper management is required (4:18). This support appears to be forming in XR to a moderate degree, since the response to Question 6 (Does your director support Total Quality?) significantly increased from the first survey to the second survey, and achieved a slightly positive rating. Emphasis is still required in this area to demonstrate strong support for the Total Quality Program, which should lead to further improvements in the culture found in XR. XRI responded significantly higher than the rest of the organization on all of the Investigative Questions which addressed culture. Since culture received such high ratings in this Directorate, the leadership style employed in XRI seems to be well-suited to their operating environment. This could serve as an example to much of XR as

to how they may attempt to make changes to better the culture within their Directorates.

Recommendations for Further Study

The recommended interviews by the Total Quality Team could be conducted by an outside agency to remove potential bias of workers in XR. The results of these interviews could then be reviewed by the Total Quality Team, and again could form the basis for implementing changes in XR. The survey which was given in November 1989 and again in May 1990 could continue to be administered on a semi-annual basis to provide feedback on the culture which exists in XR. This information could be used to continually update areas of emphasis for improvement in ASD/XR.

Appendix A. XR Total Quality Culture Survey

XR TOTAL QUALITY CULTURE SURVEY 29 May 1990

PURPOSE: This survey is issued to all XR personnel in order to measure changes in our culture. Results of this survey will be fed back to the XR populace in a timely manner. YOUR RESPONSE WILL BE HELD CLOSELY; IT IS FOR MEASUREMENT COMMITTEE USE, ONLY.

YOUR DIRECTORATE: _____

CIRCLE AS APPROPRIATE (Please indicate if you think this is too personal!):

MILITARY or CIVILIAN

SUPERVISORY or NON-SUPERVISORY

Years in Govt service? <4 4-6 7-10 11-15 16-20 21-25 >25
Years in ASD/XR? <4 4-6 7-10 11-15 16-20 21-25 >25
Age group? <25 25-30 31-35 36-40 41-45 46-55 >55

INSTRUCTIONS: Find the number on the rating scale given below which best describes your reaction and/or observations for each question. Put this number in the blank in front of each question. Additional written comments are welcome.

NOT ENOUGH INFO NO OPINION	OUTSTANDINGLY BAD NOT AT ALL NONEXISTENT	OUTSTANDINGLY GOOD EXTREMELY/TOTALLY ALL THE TIME			
0	1	2	3	4	5

TOTAL QUALITY PROCESS

- ____ 1. Are you involved in the ASD/XR Total Quality process?
- ____ 2. Do you understand the ASD/XR Total Quality process?
- ____ 3. Have you seen any benefits from the Total Quality process in ASD/XR?

_____ 4. Do you understand the purpose of each ASD/XR Total Quality committee (OFI, CA, measurement, and education)?

_____ 5. Do you think the directors support Total Quality?

_____ 6. Does your director support Total Quality?

_____ 7. Do you believe that Total Quality will make real and lasting changes for the better in the way ASD/XR business is conducted?

QUALITY

_____ 8. Are you asked for your thoughts/ideas on how to improve quality?

_____ 9. Does ASD/XR respond to employee concerns about quality?

_____ 10. Does your directorate have clear-cut, reasonable goals and objectives?

_____ 11. Does your directorate respond to employee concerns about quality?

_____ 12. Is producing a quality product/service for the customer important in ASD/XR?

_____ 13. Does your director maintain high standards of performance?

_____ 14. Does your supervisor maintain high standards of performance?

_____ 15. Do those you work with daily maintain high standards of performance?

_____ 16. Are work activities sensibly organized in your office?

_____ 17. Would your 4-letter/branch/division benefit from having its performance measured by its own members?

_____ 18. Is your 4-letter/branch/division receptive to having its performance measured by its own members?

TEAMWORK/COMMUNICATION

____ 19. How good are relations between your directorate and other directorates?

____ 20. Do different directorates plan together and coordinate their efforts?

____ 21. Is communication within your office effective?

____ 22. Does your supervisor encourage exchange of ideas and opinions?

____ 23. Does your supervisor use group meetings to solve problems?

____ 24. Before decisions are made, to what extent are the persons affected asked for their ideas?

MISSION

____ 25. Is ASD/XR a properly run organization?

____ 26. Are you aware of ASD/XR's mission?

____ 27. Do you understand ASD/XR's mission?

____ 28. Do you agree with ASD/XR's mission?

____ 29. Do you think attention to the mission will improve performance in ASD/XR?

____ 30. Are you aware of your directorate's mission?

____ 31. What do you think is the long-term outlook for ASD/XR?

____ 32. What is the long-term outlook for your work relationship with ASD/XR?

PERSONNEL

____ 33. Do you believe your personal work efforts contribute to ASD/XR's overall success?

____ 34. Are your office's work rules and policies fair and reasonable?

____ 35. Are there opportunities to learn new skills within ASD/XR?

____ 36. Are there reasonable opportunities for promotion within ASD/XR?

____ 37. Are you provided the resources you need to do your job?

____ 38. Does doing your job well lead to recognition and respect?

____ 39. Are you satisfied with your job?

____ 40. How approachable is your supervisor?

____ 41. Does your supervisor want to help you succeed in your job?

____ 42. Are you aware of your work expectations?

____ 43. Does what you actually do match your job description?

____ 44. Do you get adequate constructive feedback about how you are doing in your job?

____ 45. Is your job performance accurately measured?

CULTURE

____ 46. Will this survey capture the essence of what you consider to be organizational culture?

Please return this survey to the Measurement Committee, c/o XRM, by 12 June 1990. Again, please provide any written comments you might have.

THANK YOU FOR YOUR PARTICIPATION!

Appendix B. Pearson Correlation Coefficients

Survey 1 Pearson Correlation Coefficients

Investigative Question

	1	2	3	4	5	6	7	8
1	1.00							
2	0.63	1.00						
3	0.36	0.29	1.00					
4	0.59	0.60	0.55	1.00				
5	0.62	0.54	0.43	0.57	1.00			
6	0.70	0.54	0.55	0.60	0.56	1.00		
7	0.62	0.58	0.50	0.59	0.72	0.66	1.00	
8	0.59	0.51	0.37	0.51	0.56	0.76	0.70	1.00

Survey 2 Pearson Correlation Coefficients

Investigative Question

	1	2	3	4	5	6	7	8
1	1.00							
2	0.53	1.00						
3	0.39	0.30	1.00					
4	0.65	0.57	0.53	1.00				
5	0.34	0.49	0.46	0.57	1.00			
6	0.79	0.60	0.44	0.60	0.40	1.00		
7	0.61	0.66	0.44	0.67	0.60	0.61	1.00	
8	0.56	0.44	0.27	0.39	0.38	0.67	0.60	1.00

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